REMARKS

General:

Claims 19-37 are pending in the application. Claims 19-37 stand rejected.

35 U.S.C. § 102 rejections:

Claims 19-37 are rejected as anticipated by U.S. Patent No. 6,489,872 (Vander Heyden et al.). Vander Heyden discloses (Figs. 1 to 4) an NMR flowmeter with a constant magnet (12, 18) aligned along the axis of the pipe. The constant magnet has within its field an RF excitation coil ("tagging" coil 20 or coil 26 in the detector) aligned perpendicular to the pipe, and a detecting coil (24, 25), with axis orthogonal both to the excitation coils and to the field of the constant magnet. By modulating the excitation field, a modulation can be produced at the detector coil. By measuring the time shift between the modulations at the excitation coil and the detector coil, the fluid flow rate can be derived. An alternative embodiment (Fig. 6) pulses on and off part of the axial magnet (70) while keeping the orthogonal RF field 72 steady.

Vander Heyden gives very little information about the frequencies and strengths of his magnetic fields. However, because Vander Heyden explicitly describes his device as an "NMR flowmeter," it is reasonable to use general knowledge of NMR devices to fill in some of the blanks. The purpose of the excitation field in an NMR device is to produce quantum shifts in the magnetic moments of the atomic nuclei, which are precessing within the strong constant field. For this purpose, an excitation field of low strength but extremely high frequency (sometimes in the gigahertz range) is used. Because this is a metering technique, and Vander Heyden does not specify what fluid is being metered, it is prudent for the magnetic fields not to produce any lasting change in the fluid being measured, because such changes could both interfere with the metering and harm the fluid. Because the excitation field in a standard NMR device is of low strength, it imposes only a very slight variation on the constant background field.

The present application, on the contrary, is directed to a method of producing stereochemical deformations in the molecules of a medium, by generating as high a gradient as possible of the vector product v^H of the displacement velocity of the magnetic field by its amplitude. For this purpose, an NMR device with a weak excitation field is manifestly

unsuitable. Further, although specific frequencies of the oscillating field are not discussed, it is inherent in the stated function of the method of the present invention that the frequencies must not be high compared with the relaxation time for the required deformations. The frequencies used in NMR devices would be unsuitable.

Thus, although Vander Heyden's NMR flowmeters may be seen as generating a varying magnetic field, they do not disclose or suggest a method of creating stereochemical deformations, or of producing a magnetic field capable of creating such deformations, as claimed in the present application. There is nothing in the NMR devices of the cited reference to suggest even the possibility of a method of creating stereochemical deformations in accordance with the present invention.

For all of the above reasons, it is believed that claims 19 and 32, and claims 20-31 and 33-37 which are dependent therefrom, are not obvious over the cited prior art.

Claims 21 and 34 recite the step of providing coils to generate the first and second magnetic fields, and varying the intensities and frequencies of the currents in the first-field coils and the second-field coils independently of one another. Vander Heyden's device works by detecting the modulation of the one variable excitation coil (20 or 70). It would be contrary to Vander Heyden's teaching to have more than one variable coil (or pair of coils), because it would confuse the signals that he is trying to detect. It would be completely contrary to Vander Heyden's teaching to have components with independently variable frequencies, because Vander Heyden's device works by phase-locking the exciter to the detector. For these reasons also, it is believed that the present invention, as claimed in claims 21 and 34, is both new and non-obvious over Vander Heyden.

Claims 22 and 35 recite that the first-field coils and the second-field coils are excited by currents shifted in phase by 90°. The examiner states that Vander Heyden teaches a current "shifted in 90° phase (Π/2)" but does not analyze what that current is shifted relative to. It is shifted 90° relative to the output of the detector 48, not relative to another field-exciting coil. There is nothing in Vander Heyden to suggest that the two coils (or pairs of coils) that generate the magnetic field could both be excited by varying currents, still less that they could be phase shifted relative to one another. For these reasons also, it is believed

that the present invention, as claimed in claims 22 and 35, is both new and non-obvious over Vander Heyden.

Claims 23 and 36 recite that the first-field coils and the second-field coils are excited by currents of different frequencies. There is nothing in Vander Heyden to suggest that the two coils (or pairs of coils) that generate the magnetic field could both be excited by varying currents, still less that they could be of different frequencies. As noted above, Vander Heyden's device relies on having one varying coil or pair of coils (20, 70) to produce a clear "tag" signal for the detector. For this reason also, it is believed that the present invention, as claimed in claims 23 and 36, is both new and non-obvious over Vander Heyden.

Claims 25, 27, and 37 recite that the magnetic field plane forms an angle of between 45° and 90° with the direction of fluid flow. Where the magnetic field plane is defined by combining two fields each of which has a constant direction, as is the case in Vander Heyden's devices, the magnetic field plane is necessarily the plane containing the direction of each field. There is no suggestion in Vander Heyden of using magnets oriented in any direction except along and diametrally across the fluid conduit. Thus, in all of Vander Heyden's devices the magnetic field planes are aligned along (at 0° to) the direction of fluid flow, and there is no suggestion of any different orientation. For this reason also, it is believed that the present invention, as claimed in claims 25, 27, and 37, is both new and non-obvious over Vander Heyden.

Claim 26 recites means disposed inside the fluid pipe for generating the magnetic fields. There is no disclosure or suggestion in Vander Heyden of disposing any of the field-generating magnets or coils inside the conduit. For this reason also, it is believed that the present invention, as claimed in claim 26, is both new and non-obvious over Vander Heyden.

Claims 28 recites generating first and second magnetic fields in several parallel magnetic field planes. The examiner refers to "a pair of coils (20, 26 or 22, 24)" for generating a second magnetic field. However, as noted above with reference to claims 25 and 27, all of these will define, with the coils 18, 20, a magnetic field plane along the length of the conduit, so they do not define several parallel planes. In any case, only the pair of coils 20 has a variable excitation, so the others are not second-field coils as claimed. For

these reasons also, it is believed that the present invention, as claimed in claim 28, is both new and non-obvious over Vander Heyden.

Claim 29 recites coils with U-shaped and E-shaped cores to produce magnetic fields in two or three parallel planes. There is no disclosure or suggestion in Vander Heyden of such a structure, and it is not apparent how such a magnetic field pattern could be used in Vander Heyden's flowmeters. For this reason also, it is believed that the present invention, as claimed in claim 29, is both new and non-obvious over Vander Heyden.

Claims 30 and 31 recite processing specific liquids to produce specific effects. There is no mention of any of these fluids in Vander Heyden. Further, as noted above, Vander Heyden describes flowmeters for unspecified fluids, so the reasonable reader of Vander Heyden would seek a device that does not alter the properties of the fluid being metered. For these reasons also, it is believed that the present invention, as claimed in claims 30 and 31, is both new and non-obvious over Vander Heyden.

Conclusion:

In view of the foregoing, reconsideration of the examiner's rejections and allowance of claims 19-37 are earnestly solicited.

Respectfully submitted

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